Draft

Framework Monitoring Plan

for the

Santa Margarita River Watershed
California

307

Prepared for:

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Executive Summary

Executive Summary will be completed following review and confirmation of Draft FMP findings by the SMR Group. Below are the headings for the subsections.

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Acronyms and Abbreviations

Basin Plan	Water Quality Control Plan for the San Diego Basin
BMP	best management practices
CDM Federal	CDM Federal Programs Corporation
cfs	cubic feet per second
EMWD	Eastern Municipal Water District
EPA	Environmental Protection Agency
FMP	Framework Monitoring Plan
GIS	Geographical Information System
mgd	millions gallons per day
mg/L	milligrams per liter
mi^2	square miles
NGVD	National Geodetic Vertical Datum
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PUD	Public Utilities Department
RCWD	Rancho California Water District
RWQCB	Regional Water Quality Control Board
SMR	Santa Margarita River
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
U.S.	United States
West	West Consultants Incorporated

Section 1
Introduction

CDM Federal Programs Corporation (CDM Federal), Boyle Engineering and RECON have prepared this Framework Monitoring Plan (FMP) for the Santa Margarita River (SMR) Watershed pursuant to Contract 00-CA-30-0028, Delivery Order 00-A2-30-0028 with the United States (U.S.) Department of the Interior, Bureau of Reclamation, Lower Colorado Region. This FMP was developed to meet the goals of local, state, and federal participants and to begin to address issues related to impending regulatory mandates for the SMR Watershed.

The Santa Margarita watershed covers approximately 740 square miles in San Diego and Riverside Counties in Southern California as shown on Figure 1-1. The U.S. Bureau of Reclamation (USBR) currently holds water rights permits that were intended for surface water impoundments that the (USBR) was at one time proposing to develop. These water rights permits must be perfected (i.e., demonstrated to be put to beneficial uses) by 2007, or the water rights may be lost. These permits amount to 185,000 acre-feet per year. The USBR began facilitating discussions with other interested participants in the SMR Watershed to examine the possibility of identifying and implementing a functional equivalent to the dams and other surface impoundments originally proposed for the water rights permits. It was during these discussions that the USBR recognized that a more effective approach at water management depended on water quality monitoring that included water supply management. Therefore, FMP incorporates a watershed approach that will start the process of realizing both the current and future watershed management goals.

The FMP is the starting point for a comprehensive SMR Watershed Management Plan. This FMP will be used as the initial step towards implementing a complete and comprehensive monitoring plan that encompasses all the water quality and water management goals for the SMR Watershed.

1.1 Participants and Goals

The participants in the FMP are known as the Santa Margarita River Water Quality Monitoring Group (SMR Group). The list of members for the SMR Group has expanded over the course of the planning effort and is anticipated to continue to expand in future phases. However, not all members have demonstrated the same level of activity in the group. As of February 7, 2001 the SMR contact list included representatives from 26 organizations (in alphabetical order shown in Table 1-1). Figure 1-2 illustrates the boundaries of many of the SMR Group relative to the watershed.

Santa Margarita River Water Quality Sampling Group List of Organizations is as follows:

- CALTRANS
- Cahuilla Indian Reservation
- CA Department of Water Resources
- Conservation Biology Institute
- Eastern Municipal Water District
- Elsinore, Murrieta, Anza Resource Conservation District
- Fallbrook Public Utilities District
- Fallbrook Naval Weapons Station
- Hines Nursery
- Metropolitan Water District of Southern California
- Mission Resource Conservation District
- Murrieta County Water District
- Pechanga Indian Reservation
- Rancho California Water District
- Riverside County Flood Control and Water Conservation District
- San Diego County
- San Diego County Water Authority
- San Diego Regional Water Quality Control Board
- San Diego State University
- The Nature Conservancy
- U.C. Cooperative Extension San Diego County
- U.S. Bureau of Indian Affairs
- U.S. Bureau of Reclamation
- U.S. Environmental Protection Agency
- U.S. Geological Survey
- Santa Margarita Watermaster

The active members of the SMR Group developed a list of goals for the FMP. Generally, the goals are intended to facilitate development of water resources to meet demands in a manner consistent with sustainable use, human safety, and habitat and ecological needs, including protection of listed species.

The goals, as identified by the involved SMR Group participants, are as follows:

1. Provide monitoring data capable of supporting objective standards for water quality impairment (Section 303(d) of the Clean Water Act listing);
2. Provide monitoring data capable of supporting scientific development of total maximum daily loads (TMDLs) for contaminants of concern;
3. Provide monitoring data capable of assessing the river system's assimilative capacity for nutrients and total dissolved solids (TDS);
4. Provide water quality data that can be usefully related to contemporaneous habitat health data to determine ecological relationships between habitat health and water quality, especially as pertains to listed species on the watershed;
5. Identify water quality issues related to water supply alternatives associated with existing Reclamation water rights permits;
6. Develop a scientific basis for decisions regarding section 303(d) of the Clean Water Act listing;
7. Identify the causes of beneficial use impairments by contaminant and source, including identification of major contaminants of concern;
8. Quantify pollutant loading from stormwater and non-point source discharges;
9. Evaluate sediment transport;
10. Evaluate effectiveness of stormwater best management practices (BMPs);
11. Verify regulatory compliance (as a replacement of all existing permit requirements for monitoring) and support for future permitting; and
12. Facilitate water recycling in the watershed.

1.2 Scope of Work

The Scope of Work for the FMP was to perform the following:

- Review all available information provided by SMR Group participants on the current monitoring in the watershed;
- Identify the regulatory drivers of the SMR Group monitoring programs;
- Obtain an understanding of the SMR Group concerns regarding their current monitoring plans;

- Obtain information pertaining to suggested monitoring alternatives and goals;
- Prepare a FMP that recommends proposed future monitoring general locations and provides justifications for the proposed locations; and
- Prepare a PowerPoint® presentation that involved SMR Group participants can present to their respective boards and/or other authority figures. The presentation will provide a clear and concise rationale why a complete and comprehensive monitoring plan is required and why it should be funded and implemented.

1.3 Framework Monitoring Plan Approach

The FMP approach included attending and conducting meetings, reviewing available documents and reports, obtaining information from the Internet, contacting SMR Group, evaluating the current monitoring, identifying drivers for future monitoring, identifying potential future monitoring locations and justifications for each new location, and preparing a PowerPoint presentations for SMR Group to use.

1.3.1 Meetings

Four meetings were conducted to develop the FMP. Each meeting had a specific purpose relative to the overall project goals.

The Kick Off Meeting was conducted on November 01, 2000 and presented the FMP approach and provided an opportunity to discuss issues with the SMR Group. Most of the participants were contacted prior to the meeting to discuss their current monitoring approach, available data, data format (e.g., EXCEL®, ACCESS®, geographical information system [GIS]), and methods to receive their data. Key objectives of the meeting were to identify the key contact(s) at each participant responsible for coordination, confirm the process to receive data, define data formats, and identify dates that data will be provided.

The First Progress Meeting was conducted on December 20, 2000 and addressed the work to date, emerging issues, and schedule. Critical path issues that require input from the participants were highlighted and a process for resolving any issues was defined. A brief facilitated discussion was used to identify concerns and issues in the SMR Watershed.

In addition to addressing the work to date, emerging issues, and schedule, the Second Progress Meeting conducted on February 07, 2001, allowed for presentation of findings from the Draft FMP. Additionally, in order to develop the presentation materials, at the meeting the project team and the participants developed a preliminary storyboard for the PowerPoint® presentation. This process was intended to identify key topics and

issues to be highlighted in the presentation to ensure that key drivers for each of the SMR Group participating at the meeting are included.

The Final Meeting occurred on for April 14, 2001 and presented the Final FMP and PowerPoint presentation that incorporated SMR Group comments.

1.3.2 Review Existing Methodology and Regulations

The review process included review of information supplied by the participants followed by direct communication with designated participant staff to understand the current program, the concerns of the participant, and the participant's suggested monitoring alternatives and goals. The Internet was also a very helpful tool in locating information pertaining to the SMR Watershed.

1.3.3 Development of Framework Monitoring Plan

The FMP was developed to identify the water quality issues and general locations for monitoring in the SMR Watershed. STET provided recommendations for developing a comprehensive plan in future phases of the work.

Geographic information systems (GIS) data was used whenever available from the SMR Group to generate many of the figures used in this FMP. Most of the GIS data used was provided by several of the SMR Group, but a large portion had to be obtained through the Internet or through purchases. As identified at the First Progress Meeting, there were issues in that GIS information from one participant did not match up with GIS information from another participant. The GIS data provided by the SMR Group or acquired by other means came from a variety of sources: West Consulting (West), SANDAG, Eastern Municipal Water District (EMWD), Rancho California Water District (RCWD), Stetson Engineers (Stetson) and RECON. The data was essentially used "as is". The only change to the data was to re-project the data into UTM Zone 11 NAD83, meters so preliminary overlays were possible. The data used in the GIS has varying degrees of positional and attribute accuracy and no attempt was made to improve on the positional or attribute accuracy of the individual coverage's, shape files or databases. A GIS database was not created and there were no quality checks performed on the data of any kind. Future work will include evaluating all types of GIS information available for the SMR Watershed and provide one common set of GIS data.

Issues Addressed. The FMP addresses the water quality issues driving the 303(d) listings in the watershed, the potential issues associated with development of TMDLs, the assimilative capacity for nutrients on the river, the relationship of water quality to habitat health, and other water management drivers.

Watershed Goals. The FMP sets the stage for development of an integrated comprehensive monitoring plan that meets the goals of the SMR Group. The future

comprehensive monitoring plan will identify and address such issues as monitoring data addressing objective standards, scientific development of TMDL's, river assimilative capacity, relationships between habitat health and water quality, relationship of water quality to water supply and water rights, 303(d) listing, beneficial use impairment issues, stormwater and nonpoint source discharges, sediment, stormwater BMP's, regulatory compliance and water recycling.

Narrative Justification. The justification in this report for proposed monitoring changes is based on:

- Issues identified by the SMR Group,
- Activities and comments of regulatory agencies,
- Current and projected land uses,
- 303(d) listing information and supporting data,
- Location of streamflow measurements,
- Habitat information.

The narrative here is intended to document the process used to develop the FMP. It identifies benefits of the new plan in supporting future evaluations of assimilative capacity and in providing input to tools for TMDL development.

1.3.4 Presentation Materials

A draft and final PowerPoint® presentation has been developed that highlights the key monitoring issues on the river, the drivers for changing the monitoring approach, a summary of the FMP, benefits of the FMP, and an estimate of costs to implement the FMP and the final comprehensive plan.

1.3.5 Report Organization

This FMP is organized as follows:

- Section 1 is this current section;
- Section 2 presents an overview of the watershed including physical and regulatory issues;
- Section 3 presents the current and proposed monitoring for the SMR Watershed. The narrative includes drivers for the monitoring, proposed monitoring locations, and a justification for proposed monitoring locations;

- Section 4 presents the estimated cost for the future monitoring and for creating and implementing an integrated comprehensive monitoring plan for the SMR Watershed; and
- Section 5 presents references.

Figure 1-1

Figure 1-2

Section 2
Watershed Setting and Current Monitoring

This section discusses the watershed setting and sets the stage for discussions regarding current monitoring and the rationale for proposed monitoring under the Framework Monitoring Plan.

The Santa Margarita Hydrologic Unit is a rectangular area of about 740 square miles. Included in it are portions of Camp Pendleton as well as the civilian population centers of Murrieta, Temecula and part of Fallbrook. The unit is drained largely by the Santa Margarita River, Murrieta Creek, and Temecula Creek. The only coastal lagoon of the unit is the Santa Margarita Lagoon that lies totally within the Camp Pendleton Naval Reservation of the U.S. Marine Corps. The slough at the mouth of the river is normally closed off from the ocean by a sandbar. The major surface water storage areas are Vail Lake, O'Neill Lake, and Diamond Lake.

The San Margarita Hydrologic Unit is comprised of the following nine hydrologic areas; the Ysidora, Deluz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguanga, and Oak Grove Hydrologic Areas. The hydrologic unit, areas, and subareas are shown on Figure 2-1 and listed in Table 2-1 below.

2.1 Watershed Physical Characteristics

The following section is quoted from the July 2000 *Santa Margarita River Hydrology, Hydraulics and Sedimentation Study* prepared by West Consultants Inc. (West) for SMR Group member Camp Pendleton.

Basin Description

The Santa Margarita River basin lies in northern San Diego and western Riverside Counties and encompasses approximately 740 square miles (mi^2). The cities of Temecula and Murrieta, and portions of Camp Pendleton and the City of Fallbrook lie within the basin. Also within the basin are portions of the Cleveland and San Bernardino National Forests and the Cahuilla, Ramona, Pauma, and Pechanga Indian Reservations. Two major drainage basins compose the upper watershed: Temecula Creek (360 mi^2) and Murrieta Creek (220 mi^2). These join near the City of Temecula to form the Santa Margarita River, which flows in a southwesterly direction through Camp Pendleton to the Pacific Ocean near Oceanside, California.

Table 2-1 Areas and Subareas of the Santa Margarita Hydrologic Unit

Basin Number	Hydrologic Basin		
2.00	Santa Margarita Hydrologic Unit		
2.1		Ysidora	
2.11			Lower Ysidora
2.12			Chappo
2.13			Upper Ysidora
2.20		DeLuz	
2.21			DeLuz Creek
2.22			Gavilan
2.23			Vallecitos
2.3		Murrieta	
2.31			Wildomar
2.32			Murrieta
2.33			French
2.34			Lower Domenigoni
2.35			Domenigoni
2.36			Diamond
2.40		Auld	
2.41			Bachelor Mountain
2.42			Gertrudis
2.43			Lower Tucalota
2.44			Tucalota
2.50		Pechanga	
5.51			Pauba
2.52			Wolf
2.60		Wilson	
2.61			Lancaster Valley
2.62			Lewis
2.63			Reed Valley
2.7		Cave Rocks	
2.71			Lower Coahuila
2.72			Upper Coahuila
2.73			Anza

Topography

Topography of the upper basin is generally mountainous along the northern, eastern and southern boundaries, with valley and mesa lands in the western portions, particularly in the Murrieta Creek drainage area. Elevations range from 960 feet (using the National Geodetic Vertical Datum or NGVD) at the confluence of Murrieta and Temecula Creeks to 6812 feet at Thomas Mountain and 6138 feet at Mount Palomar. Most of the valley and mesa lands in the upper basin lie between 1000 and 1500 feet.

The topography of the lower basin is mountainous in the eastern two-thirds of the drainage area, with valley and mesa lands in the lower one-third. Elevations range from sea level at the Pacific Ocean up to about 2500 feet. In the lower basin the Santa Margarita River flows in a narrow, precipitous gorge for about 18 miles from Temecula downstream to a point below its confluence with De Luz Creek, where it emerges onto the coastal plain.

Climate

The climate of the basin varies in relation to the topography with temperature and precipitation varying directly with elevation and distance from the coast. The mean annual temperature for the coastal area of the basin, as taken from records at Oceanside from 1953 to 1998, is 61 degrees Fahrenheit, with a mean monthly winter low of 45 degrees and a mean monthly summer high of 72 degrees. The average maximum temperature is 68 degrees while the average minimum temperature is 53 degrees. For the high elevation areas of the basin, as represented by records from the Palomar Mountain Observatory (1948-1998), the average maximum temperature is 66 degrees while the average minimum temperature is 45 degrees.

The mean annual rainfall for the entire basin is approximately 16 inches (California Rivers Assessment, 1999) although the average annual rainfall for gages within the basin ranges from 11 to 27.5 inches. Over 90% of the rainfall usually occurs between the months of November and April. Using the Köpen system of climatic classification, the basin would be divided into "Steppe" areas in the lower basin and "Mediterranean hot summer" areas in the upper basin (Hornbeck, 1983). The steppe climate is characterized as a dry semi-arid environment with grassland and shrubs where evaporation exceeds precipitation on the average throughout the year. The Mediterranean hot summer classification is for areas with mild, mesothermal climates with hot, dry summers.

Soils

The soils of the watershed vary widely as reported by the Natural Resources Conservation Service (NRCS) soil surveys for San Diego and Riverside Counties. Coastal plains soils are typically well-drained sandy loams with a component of sandy clay which contributes to a relatively high fertility. Soils in this area are generally used for citrus, truck crops, avocados, and flowers (Steinitz, 1996). Foothills soils are very to moderately well-drained sandy loams to silt loams that have a coarse sandy loam to clay subsoil. Soils in this region are used for citrus avocados, and irrigated field crops. Mountain soils are excessively drained to well-drained loamy coarse sands to loams. In most areas, rock outcrops and large boulders are distributed widely. Soils in this area are generally unusable for crop production and are suitable only for range and wildlife habitat.

2.2 Basin Plan, 303(d) Listings, and TMDL for SMR

This section discusses the relationship of the Water Quality Control Plan for the San Diego Basin (Basin Plan) activities of beneficial use designation and water quality objectives to impaired waters listing under 303(d) of the Clean Water Act and Total Maximum Daily Load process.

2.2.1 Basin Plan

The following description of the Basin Plan was derived from the San Diego Regional Water Quality Control Board (RWQCB) webpage. The San Diego (RWQCB) Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of all regional waters. Specifically, the Basin Plan:

1. Designates beneficial uses for surface and ground waters;
2. Sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy;
3. Describes implementation programs to protect the beneficial uses of all waters in the Region;
4. Describes surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan.

Key definitions from the basin plan for beneficial uses and water quality objectives:

- Beneficial uses are the uses of water necessary for the survival and well being of man, plants and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals of mankind.

- Water quality objectives are the levels of water quality constituents or characteristics that must be met to protect the beneficial uses.

The Basin Plan identifies the following beneficial uses for the SMR Watershed:

- Municipal and Domestic Supply;
- Agricultural Supply;
- Industrial Service Supply;
- Industrial Process Supply;
- Ground Water Recharge;
- Contact Water Recreation;
- Non-Contact Water Recreation;
- Warm Freshwater Habitat;
- Cold Freshwater Habitat;
- Wildlife Habitat; and
- Rare, Threatened, or Endangered Species.

Figures 2-1 through 2-5 highlight the location of some of these beneficial uses in the SMR watershed.

- Figure 2-2 Ground Water Recharge (GWR) - Includes uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers. It is interesting to note that the groundwater basins shown on Figure 2-2 as defined by Stetson Engineers in studies for Camp Pendleton show little overlap with the subareas shown in the Basin Plan for GWR
- Figure 2-3 Contact Water Recreation (REC-1) - Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, white water activities, fishing, or use of natural hot springs.
- Figure 2-4 Cold Freshwater Habitat (COLD) - Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates. Although the COLD designation has not been discussed by the SMR Group as an area of concern, this definition could create challenges to the point and nonpoint dischargers in the watershed.

- Figure 2-5 Rare, Threatened, or Endangered Species (RARE) - Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

2.2.2 303(d) Listing

Section 303(d) of the federal Clean Water Act (CWA), requires States to identify waters that do not meet water quality standards (set in the Basin plan) after applying effluent limits for point sources other than POTWs that are based on the best practicable control technology currently available and effluent limits for POTWs based on secondary treatment. This list is known as the 303(d) list of impaired waters (303(d) lists). States are then required to prioritize waters/watersheds on the list for total maximum daily loads (TMDL) development. States compile this information in a list and submit the list to USEPA for review and approval.

In the SMR Watershed there are two locations listed in the 1998 California 303(d) List and TMDL Priority Schedule dated May 12, 1999 (Approved by USEPA):

Name	Pollutant/ Stressor	Source	Hydro Unit	Priority	Size Affected	Start Date	End Date
Rainbow Creek	Eutrophic	Nonpoint/Point Source	902.20	High	5 Miles	7/98	7/00
Santa Margaita Lagoon	Eutrophic	Nonpoint/Point Source	902.110	High	1 Acre	7/96	7/05

2.2.3 TMDL Overview

A TMDL is the sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources and natural background pollutants, and an appropriate margin of safety. TMDL Plans may address individual pollutants or groups of pollutants, as long as they clearly identify the links between:

- The waterbody use impairment or threat of concern.
- The causes of the impairment or threat.
- The load reductions or actions needed to remedy or prevent the impairment.

TMDLs are usually based on readily available information and studies. In some cases, complex studies or models are needed to understand how stressors are causing waterbody impairment. Where inadequate information is available to draw precise links between these factors, TMDLs may be developed through a phased approach. The phased approach enables states to use available information to establish interim targets, begin to implement needed controls and restoration actions, monitor waterbody response to these actions, and plan for TMDL review and revision in the future. Phased approach TMDLs are particularly appropriate to address nonpoint source issues.

The TMDL process provides for allocation of allowable loads or load reductions among different sources of concern, providing an adequate margin of safety. These allocations are usually expressed as wasteload allocations to point sources and load allocations to nonpoint sources. Allocations can be expressed in terms of mass loads or other appropriate measures.

Key for the SMR Watershed is the issue of data availability and the fact that the 303(d) listings for Rainbow Creek and the Santa Margarita River Lagoon are for eutrophication that is attributed to point and non-point sources. Therefore, the one-acre Santa Margarita Lagoon TMDL has the potential to impact all upstream point sources and non-point sources.

2.2.4 Rainbow Creek TMDL

The TMDL process was initiated after Rainbow Creek was identified as an impaired water body on the 1998 303(d) list. The TMDL was initiated due to eutrophication based on high nutrient (i.e., nitrogen and phosphorus) levels and was based on non-point and point sources. The Basin Plan does not establish numeric objectives, however it does have narrative objectives that assume concentrations of nitrogen in excess of 0.25 milligrams per liter (mg/L) in standing water and 1.0 mg/L in flowing streams could be expected to promote eutrophication. Nitrate concentrations in Rainbow Creek have exceeded 300 mg/L, which is over 300 times the narrative objective.

The TMDL has been prepared by the RWQCB–San Diego Region and was submitted to the U.S. EPA on April 24, 2000. Revisions to the TMDL are currently under way.

2.3 Land Use Issues in the Santa Margarita River

Southwest Riverside County has experienced tremendous growth in Temecula, Murrieta, and along the Interstate 215 corridor in the last ten years. Continued growth is anticipated for the foreseeable future. The portion of San Diego County in the SMR Watershed along the Interstate 15 corridor also continues to grow. Figure 2-6 presents both current and future land use for the SMR Watershed based on combined GIS data from a number of sources. The data has been drawn from a number of sources and is only provided here to generally highlight where potential urbanization has been

projected. There is a significant amount of conflict between the GIS data provided for the FMP. For example, some of the data showed urbanization projected to occur in the national forest. The GIS issues have been discussed during project status meetings. It is acknowledged that future work will need to address the acquisition or development of more accurate and up to date projections from the counties and cities in the watershed.

2.4 Habitat Issues in the Santa Margarita Watershed

The following is a preliminary list of species that potentially need to be addressed in developing an integrated watershed monitoring program. Figure 2-7 generally indicates where targeted species and vegetation occur in the watershed. Additional information regarding sightings of the Arroyo Chub and the Southwestern Pond Turtle collected during a 3-year study were provided by San Diego State University and are shown on Figure 2-8.

2.4.1 Target Animal Species for the Santa Margarita River Watershed

California red-legged frog (Rana aurora draytonii). The USFWS listed the California red-legged frog as a threatened species on June 24, 1996. The California red-legged frog (Rana aurora draytonii) is endemic to California and threatened within its remaining range. Activities that threatened this species include habitat destruction due to human encroachment, construction of water diversions and reservoirs, contaminants, agriculture, and livestock grazing. These activities can destroy, degrade, and fragment habitat. Non-native predators and competitors also threaten the California red-legged frog populations.

The California red-legged frog is the largest native frog in the western United States, ranging in size from approximately one to five inches. Distinguishing characteristics include a red or salmon pink belly and hind legs of adult frogs, and the back is typically brown, gray, olive, or reddish-brown with small black flecks. This species is found in a variety of habitats. The frogs breed in aquatic habitats including streams, ponds, marshes and stock ponds. During wet weather, frogs may move through upland habitats. They feed on invertebrates at night and rest during the day.

Historically, the California red-legged frog was found in 46 counties in California, currently only 23 counties support known populations. The California red-legged frog is known to occur in one stream in the Santa Margarita Watershed.

Actions needed to recover the California red-legged frog include protecting known populations and reestablishing populations, protecting suitable habitat, corridors, and core areas, developing and implementing management plans for preserved habitat, occupied watersheds, and core areas; developing land use guidelines; gathering biological and ecological data necessary for conservation of the species; monitoring

existing populations and conducting surveys for new populations; and establishing an outreach program.

Arroyo toad (Bufo microscaphus californicus). The USFWS listed the arroyo southwestern toad (Bufo microscaphus californicus)as an endangered species on January 17, 1995. The arroyo southwestern toad is endemic to southern California and has been extirpated from approximately 75 percent of its former range. Threats to this species include habitat degradation, predation, and small population sizes.

The arroyo southwestern toad is small toad, approximately two to three inches in size, with light greenish gray or tan coloration. Its skin is warty and often has dark spots. A distinguishing feature is a light-colored stripe that crosses the head and eyelids. This species is restricted to rivers that have shallow, gravelly pools adjacent to sandy terraces. This species breeds in large streams with persistent water flow from late march until mid-June. This species forages for insects on sandy stream terraces that have trees, typically cottonwood, oaks or willow, with closed canopies and little ground cover. Adult toads excavate shallow burrows where they shelter during the day during longer intervals in the dry season.

Historically, the arroyo southwestern toad occurred along the coastal region of Baja California, Mexico to the San Quintin area. Most remaining populations of the arroyo southwestern toad occur on private lands, primarily within or adjacent to the Cleveland National Forest. Habitat alternation is the most severe threat to the species. Currently, the arroyo southwestern toad is confined to the headwaters of streams it occupied historically along their entire lengths. Current threats include short- and long-term changes in river hydrology, including construction of dams and water diversions, alternation of riparian wetland habitats by agriculture and urbanization, construction of roads, site-specific damage by off-highway vehicle use, development of campgrounds and other recreational activities, over-grazing and mining activities.

Arroyo chub (Gila orcutti). The arroyo chub is native to Southern California. While it has been successfully introduced to other river systems, it is threatened in its native range. Currently, this species is mostly absent from much of their native range, and are abundant only in the upper Santa Margarita River and its tributaries. Threats to this species includes habitat degradation and fragmentation, especially in the low-gradient stream areas, hybridization with other species (California roach and Mohave tui chub), and competition from introduced species.

The arroyo chub is a small fish that typically reach lengths of three to four inches. This species has a chunky body with large eyes and a small mouth. The coloration is silver or gray to olive-green. This species prefers slow-moving or backwater sections of warm to cool streams with mud or sand substrates, typically in depths greater than one inch. The arroyo chub feeds on algae, insects and small crustaceans.

Surveys should be done annually in this species' native range. Streams should be managed to enhance the survival of the arroyo chub.

Tidewater goby (Eucyclogobius newberryi). The USFWS designated critical habitat for the tidewater goby (Eucyclogobius newberryi) on December 20, 2000. The Santa Margarita River, along with nine other streams, was designated as critical habitat. The tidewater goby is endemic to California and is restricted to coastal brackish water habitats. Historically, the species ranged from northern California near the Oregon border to the Agua Hedionda Lagoon in northern San Diego County.

The tidewater goby is a small elongate fish approximately two inches in length. Distinguishing characteristics include large, dusky pectoral fins and a ventral sucker-like disk. Coloration is nearly transparent, with a brownish upper surface typically having spots on dusky dorsal and anal fins. The tidewater goby prefers waters of low salinities in the brackish zone of estuaries and coastal lagoons, although it can tolerate a wide range of salinities. This species is typically found in water less than one meter deep. This species breeds by the male digging a breeding burrow where the female deposits the eggs, then the males guard the eggs. The tidewater goby feeds on small benthic invertebrates, crustaceans, snails, and aquatic insect larvae. Predators of the tidewater goby include native (prickly sculpin, staghorn sculpin, starry flounder) and non-native species (largemouth bass, yellowfin gobies, sunfish and channel catfish).

2.4.2 Target Plant Species

San Diego ambrosia (Ambrosia pumila). This species is proposed for federally endangered status USFWS 1999), is a narrow endemic species under the MSCP, and is a CNPS List 1B species. This perennial herb in the sunflower family (Asteraceae) emerges from rhizomes in spring and flowers from June to September. It is found in Riverside and San Diego counties and in northern Baja California. It may occur in disturbed areas in chaparral, coastal scrub, grassland, or vernal pool communities (Skinner and Pavlik 1994). Its preferred habitats in San Diego County are along creek beds, seasonally dry drainages, and floodplains along the edge of willow woodland, in riverwash or sandy alluvial soils (Rieser 1994). Primary threats to this species are highway and utility construction and maintenance, trampling by horses, humans, and off-road vehicles, and competition from non-native plants (USFWS 1999).

Nevin's Barberry (Berberis nevinii). This species is listed as endangered by the state and federal governments, and is a narrow endemic species under the MSCP. Its natural range is restricted to the interior foothills of Los Angeles, Riverside, and San Bernardino counties; two groups of cultivars occur in Spring Valley and Torrey Pines State Reserve in San Diego County. The largest known extant population is at Vail Lake in southern Riverside County, and it may be present in the nearby Agua Tibia Wilderness in San Diego County (Rieser 1994). It is a perennial evergreen shrub with stiff branched stems

and spine-tipped leaves. The flowering period for this shrub is from March to April. This species is typically found in sandy and gravelly places in chaparral, cismontane woodlands, coastal sage scrub, and riparian scrub habitats.

Thread-leaved Brodiaea (Brodiaea filifoia). This plant is federally listed as a threatened species (USFWS 1998), is a narrow endemic under the MSCP, and is a CNPS List 1B species. This perennial bulbiferous herb in the Lily Family (Liliaceae) may reach 16 inches in height. This plant may occur in coastal sage scrub, chaparral, cismontane woodland (Skinner and Pavlik 1994) and alkali scrub (State of California 2000) communities, but is most commonly found in native grasslands or in association with vernal pools (USFWS 1998). Thread-leaved brodiaea is restricted to clay, loamy sand, or alkaline silty-clay soils, and is typically found on gentle hillsides, in valleys, or in floodplains (USFWS 1998). Outside of its flowering period, in May or June, it is difficult to distinguish from grasses.

The range of thread-leaved brodiaea formerly extended from the foothills of the San Gabriel and San Bernardino Mountains in the north, through Orange County and western Riverside County, to Carlsbad in northwestern San Diego County.

Salt marsh bird's-beak (Cordylanthus maritimus). This species is a small annual plant that prefers salt marsh habitat. This species is typically found in salt marsh areas with slightly raised hammocks and the edges of salt pans. It has also been found in areas of shell ands sand dredgings. The range of this species extends south into Baja California. The salt marsh bird's beak is approaching extirpation in San Diego County and other areas of its range.

Slender-horned spineflower (Dodecahema leptoceras). This plant is an annual herb that blooms from April to June. This species is listed as endangered. Threats to this species include urbanization, development, flood control, vehicles and proposed reservoirs. This species typically inhabits alluvial sand in coastal scrub.

Coulter's goldfields (Lasthenia glabrata ssp. coulteri). This species is an annual herb which formerly ranged from Kern and San Luis Obispo Counties southward into Baja California. This species which inhabits coastal salt marshes, playas and vernal pools, has declined significantly as many historical occurrences have been extirpated.

Parish's meadow-foam (Limnanthes gracilis). This species is an annual that inhabits rocky coarse sandy loam, typically in alluvial areas. It is slowly declining in San Diego and Riverside counties. Threats to this species include increased recreational uses of montane meadows and development. This species is relatively easy to identify in meadows during the blooming season.

In general, monitoring of the target species should include monitoring of existing populations and conducting surveys for new populations, and measures to protect known populations and reestablish populations. Protection of suitable habitat and core areas is essential. A management plan for habitat, occupied areas and core areas should be developed and implemented.

2.5 Water Rights on the Santa Margarita River

A 1940 stipulated judgement for the SMR Watershed divided the water rights of the year-round natural base flow at 1/3 to Vail Ranch (now the Rancho California Water District) and 2/3 to the U.S. Government (now Camp Pendleton).

Currently, water rights on the Santa Margarita River are the responsibility of the court appointed Watermaster, James Jenks, who is part of the SMR Group. Each year the Watermaster submits a written report surface and subsurface water availability, imports and exports of water, water production and use, unauthorized water use, threats to the water supply, and water quality. An overview of the water rights on the Santa Margarita River is quoted here from the Santa Margarita River Watershed Annual Watermaster Report Water Year 1998-1999:

> On January 25, 1951, the United States of America filed Complaint No. 1247 in the United States District Court for the Southern California District of California to seek a judicial determination of all respective water rights in the Santa Margarita River Watershed. The Final Judgement and Decree was entered on May 1963, and appealed to the U.S. Court of Appeals. A modified Final Judgement and Decree was entered on April 6, 1966. Among other things the Decree provided that the Court:
>
> > ... Retains continuing jurisdiction of this cause as to the use of all surface waters in the watershed of the Santa Margarita River and all underground and sub-surface waters within the watershed of the Santa Margarita River, which are determined in any of the constituent parts of his Modified Final Judgment to be a part of the sub-surface flow of any specific river or creek, or which are determined in any of the constituent parts of this Modified Judgment to add to, contribute to, or support the Santa Margarita River stream system.

The Court appointed a Steering Committee, currently comprised of representatives from the United States, Eastern Municipal Water District, Fallbrook Public Utility District, Metropolitan Water District of Southern California, Pechanga Tribe, and Rancho California Water District, to assist the Court, to facilitate litigation, and assist the Watermaster.

A proposed settlement is currently being evaluated by the Rancho California Water District that would guarantee a minimum flow volume measured at the Gorge (located just downstream of the Murrieta Creek and Temecula Creek confluence), that no new reservoir would be constructed in the Upper Basin, that water quality will be maintained, that there will be safe yield operations, and that the annual Watermaster Report will report on the agreement implementation.

The USBR holds three water rights permits, totaling 185,000 acre-feet on the Santa Margarita River, which were originally provided to the USBR by the local and Federal partners. These permits were intended for surface impoundments that, at one time, the USBR was proposing to develop. Under California water rights law, these permits must be perfected (demonstrated to be put to beneficial use) by 2007, or the water rights may be lost. The USBR has been facilitating discussions with various interested parties in the watershed to examine a functional equivalent to dams and surface impoundments originally envisioned for those permits.

2.6 Four Party Agreement

The Four Party Agreement is an agreement between EMWD, RCWD, Fallbrook Public Utilities Department (PUD), and Camp Pendleton regarding recycled water discharge to the SMR. The agreement currently consists of 2.0 mgd of recycled water discharge into the SMR. The four agencies signed the Four Party Agreement on September 21, 1990 and were initially interested in implementing a large scale (15 to 45 mgd) recycled water discharge program into the SMR. The agreement provides, in part, that if EMWD and RCWD receive regulatory permission to discharge the recycled water to the SMR, a portion of the recycled water will be allocated for use by Fallbrook PUD and Camp Pendleton. Also, EMWD and RCWD will provide a wellhead demineralization facility at Camp Pendleton to provide water that meets all applicable requirements for potable use.

Under the Four Party Agreement 2.0 mgd of recycled water is discharged under a "pilot" program. This is a cooperative effort between EMWD and RCWD. RCWD provides treatment for the stream discharge which includes tertiary filtration, treatment for nutrient reduction, and ultraviolet disinfection.

Recycling will become more and more critical in the SMR Watershed as the area continues to develop. Recycling, other than the discharge into the SMR, is currently being performed by the EMWD and RCWD for irrigation for agriculture and landscaping. Expanded recycling is being evaluated by the USBR and local participants under the Southern California Comprehensive Water Recycling and Reuse Study (SCWRRS). Recycling also needs to be investigated for recharge of the Murrieta-Temecula Groundwater Basin. New water quality and flow sampling locations in the

FMP will provide information to assess if there is any impacts as reclamation is expanded.

2.7 Imported Water

Imported water is important in the SMR Watershed. For the water year 1998-1999, a total of 58,041 acre-feet were imported to 8 agencies in the SMR Watershed (Watermaster 2000). This figure includes 3,781 acre-feet for the Metropolitan Water District, which only stores the water in the SMR Watershed, but is not used in the SMR Watershed (Watermaster 2000). The largest importer of water is RCWD, which totals 34,490 acre-feet for the water year 1998-1999 (Watermaster 2000). Imported water has increased from 6,287 acre-feet in 1966 to the current 58,041 acre-feet in 1999 (Watermaster 2000). The general trend has been an increase in imports each year, with the few exceptions following extremely rainy years. Table 2-2 presents the monthly totals for imported water for the 1998-1999 water year.

The Native American tribes have expressed concern with imported water and potential impacts on the salt balance (i.e., TDS). Future sampling needs to include continued analysis and assessment for TDS.

Table 2-2 Imported Water for the SMR Watershed, Water Year 1998-1999

Year/ Month	EMWD	Elsinore Valley MWD	Fallbrook PUD	MWD	Rainbow MWD	RCWD	US Naval Weapons Station	Western MWD	Total Imports
1998									
October	295	506	822	180	177	2,567	17	3	4,567
November	347	461	515	68	171	1,395	8	3	2,968
December	407	246	341	100	88	1,047	7	3	2,239
1999									
January	384	410	496	166	111	984	9	2	2,562
February	467	235	322	166	78	293	6	2	1,569
March	-259	425	410	396	76	1,528	7	2	2,585
April	218	318	394	280	98	1,560	5	2	2,875
May	776	608	640	518	110	3,170	7	3	5,832
June	498	578	680	484	140	4,176	10	5	6,571
July	640	708	836	479	219	5,228	12	5	8,127
August	524	940	1,049	587	209	6,549	8	5	9,871
September	30	699	925	357	250	5,993	15	6	8,275
Totals	4,327	6,134	7,430	3,781	1,727	34,490	111	41	58,041

Notes:

Quantities in acre-feet.

Source: Annual Watermaster Report, Water Year 1998-1998 (Watermaster 2000).

Figure 2-1

Figure 2-2

Figure 2-3

Figure 2-4

Figure 2-5

Figure 2-6

Figure 2-7

Section 3
Current and Future Monitoring

The section summarizes the current monitoring and presents preliminary proposed future framework monitoring plan. The drivers that will influence future monitoring, the proposed monitoring locations, justifications for the chosen locations, and the type of data to be collected in the future are summarized.

3.1 Current Monitoring Programs

Members of the SMR Group have provided their current monitoring program information. Potentially, other monitoring programs outside the SMR Group may exist. Future more detailed analysis may determine the location, type and timing of those programs.

3.1.1 Current Monitoring Drivers

Drivers are the outside influences that generate the need for water quality monitoring. There are a number of drivers that require water quality monitoring for the SMR Watershed. They are both regulatory and beneficial in usage. They are as follows:

- Hydrologic Data
- National Pollutant Discharge Elimination System (NPDES) permits;
- District Programs; and
- Base Programs.

Hydrologic Data. A number of streamflow gages in the SMR watershed were identified on the U.S. Geological Survey webpage. The gages are summarized on Table 3-1 and shown on Figure 2-7. The drainage area and period of record are indicated on Table 3-1.

Table 3-1 USGS Stream Gage List

Station Number	Station Name	County	Drainage Area	Start Recording	End Recording
11042400	Temecula C Nr Aguanga Ca	Riverside	131	Aug-57	Sep-99
11042430	Coahuila C Trib A Anza Ca	Riverside	4.9		
11042490	Wilson C Ab Vail Lk Nr Radec Ca	Riverside	122	Oct-89	Sep-94
11042520	Temecula C A Nigger Cyn Nr Temecula Ca	Riverside	320	Feb-23	Sep-48
11042600	Temecula C Bl Vail Dam Ca	Riverside	-	Oct-77	Sep-78
11042631	Pechanga C Nr Temecula Ca	Riverside	13.8	Oct-87	Sep-99
11042700	Murrieta C A Tenaja Rd Nr Murrieta Ca	Riverside	30.04	Oct-97	Sep-99
11042800	Warm Springs C Nr Murrieta Ca	Riverside	55.4	Jun-92	Sep-99
11042900	Santa Gertrudis C Nr Temecula Ca	Riverside	90.16	Oct-92	Sep-99
11043000	Murrieta C A Temecula Ca	Riverside	222	Oct-30	Sep-99
11044000	Santa Margarita R Nr Temecula Ca	Riverside	588	Feb-23	Sep-99
11044250	Rainbow C Nr Fallbrook Ca	San Diego	10.3	Nov-89	Sep-99
11044300	Santa Margarita R A Fpud Sump Nr Fallbrook Ca	San Diego	620	Oct-89	Sep-99
11044350	Sandia C Nr Fallbrook Ca	San Diego	21.14	Oct-89	Sep-99
11044500	Santa Margarita R Nr Fallbrook,Calif.	San Diego	705	Oct-24	Sep-26
11044600	Santa Margarita R Trib Nr Fallbrook Ca	San Diego	0.52	Oct-61	Sep-65
11044800	De Luz C Nr De Luz Ca	San Diego	33.03	Oct-92	Sep-99
11044900	De Luz C Nr Fallbrook Ca	San Diego	47.5	Oct-89	Sep-90
11045000	Santa Margarita R Nr De Luz Sta Ca	San Diego	705	Oct-24	Sep-26
11045050	Santa Margarita R A Usmc Div Dam Nr Ysidora Ca	San Diego	709.96	Feb-99	Sep-99
11045300	Fallbrook C Nr Fallbrook Ca	San Diego	6.97	Oct-93	Sep-99
11045600	Oneill Lake Outlet Ch Nr Fallbrook Ca	San Diego	9.77	Oct-98	Sep-99
11045700	Oneill Lk Spill Ch Nr Fallbrook Ca	San Diego	9.77	Oct-98	Sep-99
11046000	Santa Margarita R A Ysidora Ca	San Diego	722.51	Oct-30	Feb-99
11046025	Plant 2 Discharge To Pond 2 Ca	San Diego	-	Oct-93	Sep-99

NPDES Permits. There are several NPDES permited discharges that exist within the SMR Watershed. Camp Pendleton has an industrial stormwater NPDES permit covering stormwater discharges from the developed portions of the base and five NPDES permits for its wastewater treatment plants. The Rancho California Water District (RCWD) has an NPDES permit that allows for live stream discharge of recycled tertiary treated wastewater into Murrieta Creek at a current rate of 2 million gallons per day (mgd). This discharge is done in conjunction with Eastern Municipal Water District (EMWD). There are also municipal stormwater NPDES permits for both San Diego County and Riverside County.

District Program. Rancho California Water District conducts a water quality monitoring program based on NPDES requirements, recycled water used in the SMR Watershed for irrigation and landscaping, and under the Four Party Agreement (see Section 2.6).

Base Program. Camp Pendleton conducts water quality sampling for its wastewater program (under NPDES requirements) and for its industrial stormwater program (under NPDES requirements). Camp Pendleton also performs sampling for water quality from the SMR entering Camp Pendleton.

3.1.2 Monitoring Locations

A majority of the current monitoring is being performed for regulatory purposes, mainly NPDES requirements. Table 3-1 presents the current sampling locations for the SMR Watershed provided by the SMR Group.

3.1.3 Current Data Being Collected

In general, current water quality analyses include TDS, coliform, nutrients, and chlorine. Additional parameters are also analyzed at different locations. Table 3-2 presents the type of water quality analyses being performed. Figure 3-2 illustrate the current ongoing water quality sampling locations

Table 3-2 Current Surface Water Quality Sampling Locations

Location	Participant	Type of Program	Sampling Frequency	Sampling Parameters
SMR at Camp DeLuz Road Crossing	Camp Pendleton	Base Program	Weekly	TDS, nitrate, pH, fecal coliform
SMR at Stuart Mesa [1]		NPDES	Weekly	DO, chlorine, fecal coliform, total nitrates, phosphorus, estimated flow
SMR at railroad at Interstate 5		NPDES	Weekly	DO, chlorine, fecal coliform, total nitrates, phosphorus, estimated flow
SMR at railroad at Interstate 5		Industrial Stormwater Permit	Storm Events	pH, oil and grease, TSS, SC, TOC, aluminum, lead, iron, and zinc
SMR at Temecula	Rancho California Water District	District Program	Weekly	TDS and nitrate
SMR near Ecology Reserve		Live Stream Order	Monthly/ Quarterly	TDS, pH, DO, nitrogen series, phosphorus series, residual chlorine, THM, coliforms, benthic invertebrates
SMR at Diversion Weir		Live Stream Order	Monthly/ Quarterly	TDS, pH, DO, nitrogen series, phosphorus series, residual chlorine, THM, coliforms, benthic invertebrates
SMR at Stuart Mesa [1]		Live Stream Order	Monthly/ Quarterly	TDS, pH, DO, nitrogen series, phosphorus series, residual chlorine, THM, coliforms, benthic invertebrates
Murrieta Creek u/s SR Plant		Live Stream Order	Monthly/ Quarterly	TDS, pH, DO, nitrogen series, phosphorus series, residual chlorine, THM, coliforms, benthic invertebrates
Murrieta Creek at Temecula	Riverside County Flood Control and Water Conservation District[2]	Municipal Stormwater Permit	Quarterly	Standard chemicals, oil and grease, phosphorus (dissolved and total), nitrogen, turbidity, carbon, barium, and boron

Table 3-2 Current Surface Water Quality Sampling Locations (continued)

Location	Participant	Type of Program	Sampling Frequency	Sampling Parameters
Upper Murrieta at Cole Canyon		Municipal Stormwater Permit	Quarterly	Standard chemicals, oil and grease, phosphorus (dissolved and total), nitrogen, turbidity, carbon, barium, and boron
Temecula Creek at Pala Road		Municipal Stormwater Permit	Quarterly	Standard chemicals, oil and grease, phosphorus (dissolved and total), nitrogen, turbidity, carbon, barium, and boron

Notes:

(1) Sampled by both Camp Pendleton and Rancho California Water District

(2) The Riverside County Flood Control and Water Conservation District also samples 14 stormwater outfalls for its Municipal Stormwater Permit.

DO = dissolved oxygen
SC = specific conductance
SMR = Santa Margarita River
THM = trihalomethanes
TSS = total suspended solids

3.2 Future Monitoring

The interrelated nature of the water management issues in the SMR Watershed is driving the need for an integrated monitoring approach that addresses the SMR Group goals listed in Section 1. This section identifies monitoring issues to be addressed and proposed monitoring to accomplish the goals set forth by the SMR Group.

3.2.1 Issues to be Addressed

The interrelated issues affecting the SMR Watershed have created the need for evaluating water quality not just for at the lower end of the watershed, at the Lagoon TMDL site but in an integrated manner for the entire 740 square miles of the watershed. The issues discusses in this section are :

- Total Maximum Daily Load (TMDL);
- Beneficial Uses;
- Non-point source discharges;
- Point source discharges;
- Assimilative capacity of the river;
- Habitat health;
- Sediment transport;
- Imported Water;
- Water supply rights; and
- Four Party Agreement.

TMDL. There are two water bodies listed on the 303(d) list for the SMR Watershed. The first is Rainbow Creek and the second is the Santa Margarita Lagoon. The Rainbow Creek TMDL is discussed in Section 2.2.4. While the TMDL for Rainbow Creek affects only the Rainbow Creek drainage basin, the TMDL for the Santa Margarita Lagoon has much greater potential impact to the entire SMR Watershed. The Santa Margarita Lagoon is located at the mouth of the SMR that is the drainage mouth for the entire watershed. Any contaminant loading allocations identified in the upcoming TMDL could affect every subbasin in the SMR Watershed.

Like Rainbow Creek, the Santa Margarita Lagoon was placed on the 303(d) list because of eutrophication impacts resulting from both point and non-point sources. A TMDL is tentatively scheduled to commence in 2008.

One challenge associated with the TMDLs for Rainbow Creek and the Santa Margarita Lagoon is the criteria for a narrative definition of eutrophication and how to assess

cleanup or return to its natural state. Are water quality analyses the only indicator, or can the degree of eutrophication be documented using photography of other visual means? For example, eutrophication might be addressed qualitatively by the presence of algal mats, such as in the Malibu Creek Lagoon in Los Angeles County. Regulatory agencies might require photography and measurements of Chlorophyll-a, Total Nitrogen, and Total Phosphous. Answers to these questions must be investigated and defined for the final comprehensive monitoring plan.

Beneficial Uses. There are four key beneficial uses as identified in the Basin Plan that could significantly affect water quality monitoring in the SMR Watershed. They are Ground Water Recharge, Contact Water Recreation, Cold Freshwater Habitat, and Rare, Threatened, or Endangered Species. (See Figure 2-2 through 2-5)

The following groundwater basins can be found in the SMR Watershed:

- Aguanga GWA;
- Wilson Creek - Above Aguanga GWA;
- Temecula Creek;
- Upper Murrieta Creek;
- Lower Murrieta Creek;
- Murrieta-Temecula GW;
- De Luz Creek;
- Sandia Creek;
- Rainbow Creek; and
- Santa Margarita River.

Groundwater recharge plays a crucial role in the SMR Watershed in that a majority of water used in the SMR Watershed comes from these groundwater basins. Water entering these basins, either naturally or via recharge programs, must be monitored to ensure that this recharge water meets water quality requirements for the specified beneficial use. TDS and nutrients are anticipated to be key parameters in light of imported water and non-point source contributions to the basin. Poor water quality could limit the ability to store additional water in conjunctive use programs.

Contact Water Recreation involves those surface waters that can be used for recreation that involved direct contact with the water. Monitoring needs to continue to evaluate if water quality is affecting this type of beneficial use.

The Cold Freshwater Habitat beneficial use definition could prove to have a significant impact of flexibility to water resources management in the SMR Watershed. Although this use has not been highlighted as a key issue in the SMR Watershed by the project local participants, it could present a significant challenge to future watershed management schemes by the USBR to exercise its water rights. Sampling programs to confirm or deny the appropriateness of the Cold Freshwater Habitat beneficial use at this time is a prudent activity.

The Rare beneficial use designation is addressed below in Habitat Health

Habitat Health. There are a number of federally and state listed endangered or threatened species in the SMR Watershed as described in Section 2.4.1. The primary threats to the target species include pesticides and herbicides, salinity, dissolved oxygen levels, and turbidity. The fish species, arroyo chub and tidewater goby, are most susceptible to changes in dissolved oxygen levels, increased turbidity. Specifically, the tidewater goby is susceptible to changes in salinity, since it is an estuarine species. The amphibian species, arroyo southwestern toad and California red-legged frog, are most vulnerable to pesticides, including effects from bioacculumation in their prey. The plant species are vulnerable to herbicides and changes in salinity.

In addition, some chemicals of concern may be present in the watershed due to agriculture and land use practices. The use of these chemicals in the watershed should be determined to establish an effective monitoring plan to detect the impact of these chemicals on the target species. Water quality monitoring tests should include methods to determine the levels of these chemicals in the watershed area

Non-Point Source Discharges. Non-point source discharges are reported to be the largest contributor to surface water pollution in the watershed. The definition of a non-point discharge is pollution that does not come from a defined discrete source, such as a pipe. Non-point source discharges are typically associated with urban or agricultural runoff. Stormwater typically conveys non-point source pollution discharges into the streams, creeks, and rivers within the watershed.

Factors that affect non-point source discharges include existing and future land use, stormwater BMPs, and the Phase II stormwater regulations that will go into affect in 2002. Because non-point source discharges have such a large potential for polluting the beneficial waters in the watershed, it is imperative that the type of monitoring performed is sufficient to assess the load of pollutants the non-point source discharges are adding to the watershed.

Land Use. Land use can have a tremendous affect on non-point source discharges. As the urbanized area replaces natural habitat areas it's potential for non-point source discharges increases. More homes potentially means more fertilizers, more pesticides,

more cars, more car washings, more household chemicals, and more yard clippings. As additional open and naturally vegetated areas are asphalted over, the natural absorption capabilities of the watershed are diminished. With less absorption ability, additional stormwater runoff is conveyed into the storm drain system and the peak stormwater flow data can increase the greater likelihood for polluted runoff to reach surface waters in the watershed.

Figure 3-3 presents both current and future percent urbanization per subarea for the SMR Watershed based on combined data from a number of sources (see section 2.3). The change to a greater percentage of urbanization in the watershed is demonstrated by the darker colors in the future condition.

Another issue related to increased development in a watershed is sedimentation runoff associated with construction activities. Current stormwater regulations require any construction activity affecting an area more than 5 acres in size to have a Notice of Intent (NOI) submitted to the State Water Resource Control Board (SWRCB) and are required to have a Stormwater Pollution Prevention Plan prepared. Phase II stormwater regulations, as discussed below, will include those construction activities affecting more than one acre to submit an NOI.

Stormwater BMPs. Structural and non-structural stormwater BMPs are used for both industrial and municipal stormwater programs to reduce potential pollution. The final comprehensive monitoring plan should allow for evaluation of existing structural and non-structural BMPs in place in the SMR Watershed, and provide information to implement recommendations for modifying the current program. A "Pilot" BMP Program is recommended for assessing the effectiveness of BMPs being performed in the SMR Watershed. Because many urban areas in Southern California can be fairly similar, data that has been collected from other watershed along with data collected from several locations in the SMR Watershed could provide sufficient data for assessing the BMP effectiveness. This recommended BMP Pilot Program would be detailed in the comprehensive monitoring plan.

Phase II Stormwater Regulations. Phase II stormwater regulations will extend coverage of the NPDES stormwater program to small municipal stormwater systems. Implementation of the Phase II regulations begins in 2002 and will affect all urbanized areas not covered under the Phase I stormwater regulations (Phase I regulations covered urbanized areas serving over 100,000 people).

The Phase II regulations include the following minimum control measures:

- Public education and outreach;
- Public participation/involvement;

- Illicit discharge detection and elimination;
- Construction site runoff control for sites that disturb one or more acres;
- Post construction runoff control; and
- Pollution prevention/good housekeeping.

The final comprehensive monitoring plan will need to provide information to establish and measure the effectiveness for each of these minimum control measures.

Point Source Discharges. There are several point source discharges in the SMR Watershed. These permitted point source discharges are released by Camp Pendleton, RCWD, and the EMWD. Camp Pendleton has five NPDES permits associated with their wastewater treatment plants with a combined total discharge of 6.6 mgd. RCWD has an NPDES permit for its recycled water it discharges into the SMR at a capacity of 2.0 mgd. This recycled water discharge is performed in association with EMWD. Continued monitoring at these point discharges will be unchanged under future monitoring.

Assimilative Capacity of the Santa Margarita River. Several participants within the SMR Watershed have concerns regarding the assimilative capacity of the SMR. This FMP is intended to highlight key locations for calculating flow and water quality measurements to allow for estimates of mass loading. The final comprehensive monitoring plan will refine the locations to allow estimates of the assimilative capacity for phosphorus, TDS, and nutrients. A monitoring site in included in the FMP to add information to allow future evaluation of assimilative capacity

Sediment Transport. The *Santa Margarita River Hydrology, Hydraulics and Sedimentation Study* (WEST 2000) developed a set of hydrologic, hydraulic, and sedimentation models to address water quality issues in the SMR Watershed. The study performed a sediment yield analysis which was used in conjunction with the hydraulic model (also prepared in the study) to prepare a sediment transport model. This sediment transport model can be improved using additional flow data activated by the FMP. Better calibration will allow assessing sediment transport in the final comprehensive monitoring plan.

Two suspended sediment gaging stations should be established in the SMR Watershed. One located at the gorge just below the confluence of the Murrieta Creek and Temecula Creek at the location of the USGS flow gage "Santa Margarita near Temecula" and one located at the Basilone Road Bridge on Camp Pendleton. Data from these stations can be used to calibrate the model.

Imported Water. Imported water will continue to be important in the SMR Watershed.. The general trend has been an increase in imports each year, with the few exceptions following extremely rainy years. The Native American tribes have expressed concern

with imported water and potential impacts on the salt balance (i.e., TDS). Future sampling needs to include continued analysis and assessment for TDS.

3.3 Proposed Monitoring Locations

The proposed monitoring locations in the FMP for future surface water quality sampling include both new locations and locations that are currently being monitored. Table 3-3 presents the types of monitoring that would be appropriate for each of the 14 goals identified for the SMR Watershed (see Section 1.1). Figure 3-4 shows the proposed locations and provides a brief summary as to why these locations were selected. Table 3-4 presents the new locations identified on Figure 3-4, plus expanded justifications for each sampling location and the type of data to be collected at each sampling location.

The current monitoring program should continue as is with the following changes:

- The sampling located at SMR at Stuart Mesa is being performed by two separate participants with overlapping of many analyses. This sampling should be coordinated into a single joint effort.
- Flow gaging stations should be installed at the following locations:
  - SMR at Camp De Luz Road Crossing;
  - Upper Murrieta Creek at Cole Canyon; and
  - Temecula Creek at Pala Road.

New water quality monitoring stations should include the following:

- De Luz Creek near SMR (for TMDL data);
- Sandia Creek at gaging station (for TMDL data);
- Rainbow Creek at gaging station (for TMDL data);
- Pechanga Creek at gaging station (for TMDL data);
- Santa Gertrudis Creek at gaging station (for TMDL data);
- Warm Springs Creek at gaging station (for TMDL data);
- Murrieta Creek just downstream of SR Plant (for assimilative capacity);
- Temecula Creek downstream of Cottonwood Creek (for TMDL data)
- Multiple locations near listed animal and plant species (for habitat data)
- SMR near Temecula (suspended sediment gaging station data); and
- Basilone Road Bridge (suspended sediment gaging station data).

In addition to the specified purpose, it is anticipated that sampling at these locations will support analysis for many of the other identified drivers. It is important to note that a monitoring plan should be flexible. The monitoring program should be evaluated on an annual basis and changes made where and when appropriate. The comprehensive monitoring plan will need to allow for this annual evaluation and the potential annual changes. By using a flexible program, data needs can be met more accurately and efficiently.

Table 3-3 Types of Monitoring per Watershed Goal

	Framework Monitoring Plan Goals												
Type of Monitoring	**1**	**2**	**3**	**4**	**5[a]**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Instream:													
Flow Rate/ Quality Data	X	X	X	X		X	X	X	X	X		X	X
Hot Spot	X	X				X	X	X					
Habitat Assessment/ RBI				X			X						
Stream Geomorphology				X			X	X	X			X	X
Source:													
Municipal Stormwater Quality	X	X				X	X	X	X				X
Point Source	X	X	X			X	X	X	X			X	X
Agriculture													
- Avocados and Grapes	X	X	X			X	X	X	X				X
- Nurseries	X	X	X			X	X	X	X				X
- Grazing	X	X	X			X	X	X	X				X
BMP Pilot Testing										X			

Goals:

1. Provision of monitoring data capable of supporting objective standards for water quality impairment (section 303(d) of the Clean Water Act listing);
2. Provision of monitoring data capable of supporting scientific development of TMDL's for contaminants of concern;
3. Provision of monitoring data capable of assessing the river system's assimilative capacity for nutrients and total dissolved solids (TDS);
4. Provision of water quality data that can be usefully related to contemporaneous habitat health data to determine ecological relationships between habitat health and water quality, especially as pertains to listed species on the watershed;
5. Identification of water quality issues related to water supply alternatives associated with existing Reclamation water rights permits;
6. Scientific basis for decisions regarding section 303(d) of the Clean Water Act listing;
7. Identification of the causes of beneficial use impairments by contaminant and source, including identification of major contaminants of concern;
8. Quantification of pollutant loading from stormwater and non-point source discharges;
9. Evaluation of sediment transport;
10. Evaluation of effectiveness of stormwater BMPs;
11. Verification of regulatory compliance (as a replacement of all existing permit requirements for monitoring) and support for future permitting;
12. Facilitating water recycling in the watershed; and
13. Facilitating development of water resources to meet demands in a manner consistent with sustainable use, human safety, and habitat and ecological needs including protection of listed species.

Note:

a – No sampling is identified because the goal does not require water quality sampling.

Table 3-4 Proposed Monitoring

Sampling Location	Type of Monitoring	Flow Gage Station (Y/ N)	Install Flow Gage (Y/ N)	Sampling Frequency	Parameters [1]
SMR at Camp DeLuz Road Crossing	Current - Instream	N	Y	Weekly	TDS, nitrate, pH, fecal coliform, **phosphorus**
SMR at Stuart Mesa	Current - Instream	N	N	Weekly/ Monthly/ Quarterly	Weekly: DO, chlorine, coliform, total nitrates, phosphous, Est. flow Monthly/Quarterly (in addition to weekly): TDS, pH, THM, benthic invertebrates
SMR at railroad at Interstate 5	Current - Instream	N	N	Weekly/ storm events	Weekly: DO, chlorine, coliform, total nitrates, phosphous, Est. flow Storm events: pH, oil and grease, TSS, SC, TOC, aluminum, lead, iron, zinc
SMR at Temecula	Current - Instream	Y	N	Weekly	TDS, nitrate, and **phosphorus**
SMR near Ecology Reserve	Current - Instream	?	?	Monthly/ Quarterly	Monthly/Quarterly: TDS, pH, THM, benthic invertebrates
SMR at Diversion Weir	Current - Instream	Y	N	Monthly/ Quarterly	Monthly/Quarterly: TDS, pH, THM, benthic invertebrates
Murrieta Creek u/s SR Plant	Current - Instream	Y	N	Monthly/ Quarterly	Monthly/Quarterly: TDS, pH, THM, benthic invertebrates, **phosphorus**
Murrieta Creek at Temecula	Current - Instream	Y	N	Monthly/ Quarterly	Monthly: TDS and nutrients. Quarterly: Standard chemicals, oil and grease, phosphorus, nitrogen, carbon, barium, and boron
Upper Murrieta at Cole Canyon	Current - Instream	N	Y	Quarterly	Standard chemicals, oil and grease, phosphorus, nitrogen, carbon, barium, and boron
Temecula Creek at Pala Road	Current - Instream	N	Y	Quarterly	Standard chemicals, oil and grease, phosphorus, nitrogen, carbon, barium, and boron
New Locations					
De Luz Creek near SMR	Instream	N	Y	Quarterly	TDS and nutrients

Table 3-4 Proposed Monitoring (Continued)

Sampling Location	Type of Monitoring	Flow Gage Station (Y/ N)	Install Flow Gage (Y/ N)	Sampling Frequency	Parameters [1]
Sandia Creek at gaging station	Instream	Y	N	Quarterly	TDS and nutrients
Rainbow Creek at gaging station	Instream	Y	N	Quarterly	TDS and nutrients
Pechanga Creek at gaging station	Instream	Y	N	Quarterly	TDS and nutrients
Tecalota Creek at gaging station	Instream	Y	N	Quarterly	TDS and nutrients
Warm Springs Creek at gaging station	Instream	Y	N	Quarterly	TDS and nutrients
Murrieta Creek just downstream of SR Plant	Instream	N	Y	Monthly	TDS and nutrients
Temecula Creek downstream of Cottonwood Creek	Instream	Y	N	Quarterly	Temecula Creek downstream of Cottonwood Creek
SMR near Temecula	Instream – Suspended Sedimentation Gage	Y	N	Monthly	SMR near Temecula
Basilone Road Bridge	Instream – Suspended Sedimentation Gage	N	N	Monthly	Basilone Road Bridge
Locations (9) near Listed Animal and Plant Species	Instream	Varies	Y (for 6)	Quarterly	Pesticides and Herbicides

Notes:
(1) Parameters in bold type are new parameters from the current sampling parameters.

Figure 3-1

Figure 3-2

Figure 3-3

Figure 3-4

Section 4
Future Activities & Cost Analysis

This section presents the preliminary estimates of cost for performing the proposed monitoring described in Section 3 for the Framework Monitoring Plan and provides a preliminary list potential tasks for the comprehensive monitoring plan and for additional tasks to address the goals developed by the SMR Group.

4.1 Proposed FMP Sampling Cost

A preliminary estimate of annual costs has been developed for the monitoring sites identified in Table 3-4 and summarized in Table 4-1 below. This estimated cost is based upon the newly identified sampling parameters identified for the current monitoring program, the cost for data processing of flow gaging stations, and the cost for operation of all monitoring locations. This is the total costs for all sampling and not the incremental costs beyond current sampling. In this way the total future costs are estimated on the same basis rather than using potentially different costs for different members of the SMR Group. The installation costs of new monitoring or gaging sites have not been estimated under the assumption that some or all of the sites might be installed with SMR Group agency staff.

The FMP costs include labor, other direct costs, laboratory analysis, and streamflow data processing by the USGS. The labor costs include the costs to drive to the sites, obtain the samples, provide the samples to a laboratory, and manage of the invoicing and documentation process. Other indirect costs associated with the expenses include such items as mileage, field supplies, etc. Laboratory costs are included as a separate item. Finally, a preliminary estimate of USGS charges for annual data processing of streamflow gages is provided based on estimates from the Santa Ana River:

Preliminary Estimate of Framework Monitoring Plan Annual Costs:

Labor:	$125,000
Other Direct Costs:	$6,000
Laboratory Analysis:	$95,000
Streamflow Gage Data Processing:	$396,000
Total Annual Costs:	$622,000

Table 4-1. Framework Monitoring Plan Sites

Sampling Location	Type of Monitoring
Existing Locations	
SMR at Camp DeLuz Road Crossing	Current - Instream
SMR at Stuart Mesa	Current - Instream
SMR at railroad at Interstate 5	Current - Instream
SMR at Temecula	Current - Instream
SMR near Ecology Reserve	Current - Instream
SMR at Diversion Weir	Current - Instream
Murrieta Creek u/s SR Plant	Current - Instream
Murrieta Creek at Temecula	Current - Instream
Upper Murrieta at Cole Canyon	Current - Instream
Temecula Creek at Pala Road	Current - Instream
New Locations	
De Luz Creek near SMR	Instream
Sandia Creek at gaging station	Instream
Rainbow Creek at gaging station	Instream
Pechanga Creek at gaging station	Instream
Tecalota Creek at gaging station	Instream
Warm Springs Creek at gaging station	Instream
Murrieta Creek just downstream of SR Plant	Instream
Temecula Creek downstream of Cottonwood Creek	Instream
SMR near Temecula	Instream – Suspended Sedimentation Gage
Basilone Road Bridge	Instream – Suspended Sedimentation Gage
Locations (7) near Target Species	Instream

4.2 Comprehensive Monitoring Plan Activities

Activities on the Framework Monitoring Plan have identified a number of data gaps and unresolved issues that need to be addressed. The comprehensive monitoring plan will rely on completion of the following elements:

1. **Database Design:** Coordinate with San Diego State University, U.S. Environmental Protection Agency Office of Water (regarding the use of the STORET System), the counties, and other agencies. Design a single SMR Watershed database with the involved parties for all historical and future water

quality sampling. Identify cost-effective approaches for making data available using Web-based technologies.

2. **GIS Database Development:** Design/coordinate a standard GIS format and consistency for the SMR Watershed. Meet with agencies developing land use data for the counties, cities, tribes, and agencies in the watershed. Acquire the most current land use data and develop a consistent set of land use categories to apply to the watershed for water management planning activities. Develop a composite land use for current and future conditions to better define water quality sampling needs.
3. **Water Quality Model:** Identify potential models that would be appropriate for preliminary and ultimate water quality modeling in the watershed to meet the SMR Group goals such as TMDL development and assimilative capacity. The proposed model must be able to address water quantity and quality in the surface and groundwater to accurately address the questions posed by the SMR Group in its list of goals. Develop and apply screening level model to identify key water quality areas to assist in developing the final monitoring locations and to support the program justification with the San Diego RWQCB.
4. **Stormwater BMP:** Develop Stormwater BMP Pilot Program using available Southern California data from CALTRANS, counties, and cities in combination with ongoing regional data to determine the potential effectiveness of proposed programs in the watershed and how to monitor effectiveness.
5. **Water Quality Monitoring:** Refine water quality monitoring approach working with SMR Group agencies' staff and other organizations identified to be collecting samples. Identify activities that can be done by the agencies and those that need to be done with outside support. Develop a cost estimate of all costs including outside services and in-kind services for a cost-effective program.
6. **Streamflow Monitoring:** Refine streamflow gaging approach working with the Watermaster and U.S. Geological Survey. Identifying and document the parameters to be addressed to quantifying the relationship between water supply rights and water quality. Develop final costs for stream gaging installation and data processing.
7. **Habitat Monitoring Issues:** Refine monitoring approach to identifying and understanding the relationship between habitat health and water quality working with Riverside County HCP team and the San Diego State University programs. Combine and resolve any differences between habitat databases. Develop preliminary flow and quality objectives to meet habitat requirements.
8. **Sampling and Analysis Plan:** Prepare one a standard Sampling and Analysis Plan (to include a Field Sampling Plan and a Quality Assurance Plan) for the SMR Watershed.

9. **Activities with San Diego RWQCB:** Develop a process for working with the San Diego RWQCB to receive approval for revisions to individual monitoring plans that allows for a watershed based monitoring approach. Identify the features and benefits and prepare draft and final presentations to the staff and Board. Attend meetings with the staff and Board to discuss the proposed monitoring plan.
10. **Draft and Final Plan Report**
11. **Workshops with the SMR Group**

4.3 Potential Future Activities to Meet SMR Group Goals

The development of a Comprehensive Monitoring Program does not in itself address all the goals defined by the SMR Group. Additional tasks will be needed to use the data in combination with analytical tools and decision support tools to address the range of issues raised by the SMR Group. Following is a list of potential activities that can be initiated during development of the Comprehensive Monitoring Plan and proceed beyond the Plan to manage the water resources of the Santa Margarita River.

- Support scientific development of TMDL: Apply data from the Comprehensive Monitoring Plan to develop a sophisticated watershed model for the development of the rationale and documentation of a TMDL.

- Estimate assimilative capacity of the SMR: Apply data to watershed model to estimate the assimilative capacity and address the issues associated with the Four-Party Agreement.

- Identify relationship between habitat health & water quality: Apply the data and watershed model to compare current and projected water quality and quantity to habitat needs in the critical reaches of the watershed.

- Identify relationship between water supply rights & water quality: Apply data and watershed model to illustrate the linkages between local runoff, imported water, and groundwater basins to address water management options. Formulate and evaluate alternatives for perfecting USBR water rights for the benefit of local sponsors and the protection of the watershed habitat.

- Address water recycling water quality issues: Coordinate water quality and quantity opportunities with the USBR SCCWRRS and follow-on studies to maximize beneficial uses of recycled water in the watershed;

- Review Beneficial Use Designation. Use the database to evaluate the beneficial use designation in the Basin Plan. Where appropriate recommended potential revisions that are justified by data provided through sampling and monitoring programs in combination with GIS data.

- Identify beneficial use impairments: Apply the data and watershed model to address and evaluate proposals for changes in land use as to their potential impacts on beneficial uses.

- Support implementing Phase II stormwater regulations: Work with the counties and local agencies to apply the water quantity and quality database derived from the Comprehensive Monitoring Plan to address the regulations.

- Apply new data to existing sediment transport model: Use data from the new sampling program to address the projected changes in land use and to identify impacts to property, water supply, and habitat health

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Section 5
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Appendix A